

## CLAIMS

What is claimed is:

1        1. An apparatus comprising:  
2              a mask protective device including a transparent portion that is transparent to a  
3              photolithography radiation;  
4              a patterned mask including a pattern defined at least in part by an opaque  
5              portion that is opaque to the particular photolithography radiation;  
6              a wall to connect the mask protective device with the patterned mask, the mask  
7              protective device, the patterned mask, and the wall defining a gas-filled enclosure; and  
8              a vent to add a first gas to the enclosure and to remove a second gas from the  
9              enclosure, the first gas having a substantially different composition than the second  
10          gas.

1        2. The apparatus of claim 1, wherein the mask protective device is  
2          attached to the patterned mask with an adhesive.

1        3. The apparatus of claim 1, further comprising a gas source having a  
2          higher concentration of the first gas than the enclosure and a lower concentration of  
3          the second gas than the enclosure and connected with the vent to add the first quantity  
4          of the first gas to the enclosure through the vent.

1        4. The apparatus of claim 1, wherein the vent includes a first enclosure  
2          opening defined by the wall and a second enclosure opening defined by the wall.

1        5. The apparatus of claim 4, wherein the wall has a first side and a second  
2          side opposite the first side, and wherein the first enclosure opening is in the first side  
3          and the second enclosure opening is in the second side.

1       6.     The apparatus of claim 1, further comprising a radiation source to  
2 generate radiation with a different wavelength than the photolithography radiation to  
3 transmit radiation through the enclosure to increase the rate of diffusion of the gas in  
4 the enclosure.

1       7.     The apparatus of claim 1, further comprising a rotary vacuum  
2 generator, the rotary vacuum generator including a rotor and a compression chamber  
3 to reduce the total pressure inside the enclosure to below 500 millimeters of mercury.

1       8.     The apparatus of claim 1, wherein the first gas that has a higher  
2 transmissivity for the photolithography radiation than the second gas.

1       9.     The apparatus of claim 1, wherein the vent has a surface area on the  
2 wall that is at least five percent of a total surface area of the wall.

1       10.    The apparatus of claim 1, wherein the vent comprises:  
2              an inlet opening defined by the wall to add a first gas to the enclosure; and  
3              an outlet opening defined by the wall to remove a second gas from the  
4              enclosure.

1       11.    The apparatus of claim 10, further comprising:  
2              a gas source having the first gas at a pressure that is higher than the  
3              pressure of the enclosure and connected with the inlet opening to add the first gas to  
4              the enclosure through the inlet opening; and  
5              a gas destination having a volume at a pressure that is lower than the pressure  
6              of the first gas at the gas source and connected with the outlet opening to remove the  
7              second gas from the enclosure through the outlet opening.

1           12.     The apparatus of claim 10, wherein the wall has a first side and a  
2     second side opposite the first side, and wherein the inlet opening is in the first side of  
3     the wall and the outlet opening is in the second side of the wall.

1           13.     The apparatus of claim 10, wherein the inlet opening includes a  
2     plurality of discrete ports.

1           14.     The apparatus of claim 10, wherein the first gas absorbs less of the  
2     photolithography radiation than the second gas.

1           15.     An apparatus comprising:  
2         a mask protective device including a transparent portion that is transparent to a  
3     particular photolithography radiation;  
4         a patterned mask including a pattern defined at least in part by an opaque  
5     portion that is opaque to the particular photolithography radiation;  
6         a wall to connect the mask protective device with the patterned mask, wherein  
7     the mask protective device, the patterned mask, and the wall define an enclosure; and  
8         a gas filling the enclosure, the gas having a transmissivity of the  
9     photolithography radiation greater than that of the surrounding ambient air.

1           16.     The apparatus of claim 15, wherein the mask protective device is  
2     attached to the patterned mask with an adhesive.

1           17.     The apparatus of claim 15, wherein the gas filling the enclosure  
2     includes less than 10% molecular oxygen by volume.

1           18.     A method comprising:

2                   adding a first gas to an enclosure filled with a second gas through a  
3   vent, the first gas having a different composition than the second gas, and the  
4   enclosure being between a mask protective device having a portion that is transparent  
5   to a photolithography radiation, a patterned mask having a portion that is opaque to the  
6   photolithography radiation, and a wall connecting the mask protective device with the  
7   patterned mask; and

8                   removing the second gas from the enclosure through the vent.

1                 19.   The method of claim 18, wherein adding the first gas comprises adding  
2   the first gas through an inlet opening of the vent, and wherein removing the second  
3   gas comprises removing the second gas through an outlet opening of the vent.

1                 20.   The method of claim 19, wherein adding comprises driving the first gas  
2   into the enclosure through the inlet opening by pressure, and wherein removing  
3   comprises simultaneously driving the second gas from the enclosure through the outlet  
4   opening by pressure.

1                 21.   The method of claim 18, wherein adding a first gas comprises adding a  
2   molar quantity of gas substantially similar to the molar quantity of the second gas in  
3   the enclosure before adding begins.

1                 22.   The method of claim 18, wherein adding comprises adding a first gas  
2   that has a higher transmissivity for the photolithography radiation than the second gas.

1                 23.   The method of claim 18, wherein:  
2                   adding the first gas comprises providing a higher concentration of the first gas  
3   on an outside of the enclosure than on an inside of the enclosure proximate the vent  
4   and adding the first gas to the enclosure by diffusion; and

5           removing the second gas comprises providing a lower concentration of the  
6   second gas on an outside of the enclosure than on an inside of the enclosure proximate  
7   the vent and removing the second gas from the enclosure by diffusion.

1           24.     The method of claim 23, wherein adding the first gas comprises adding  
2   the first gas through at least two openings of the vent, and wherein removing includes  
3   removing the second quantity of the second gas through the at least two openings.

1           25.     The method of claim 18, further comprising transmitting radiation  
2   having a different wavelength than a wavelength of the photolithography radiation  
3   through the enclosure to increase the diffusion coefficient of a molecule in the  
4   enclosure.

1           26.     The method of claim 18, further comprising reducing the total pressure  
2   inside the enclosure to below 500 millimeters of mercury.

1           27.     The method of claim 18, wherein adding comprises adding a first gas  
2   that has a higher transmissivity for the photolithography radiation than the second gas.

1           28.     A method comprising:  
2                         attaching a mask protective device having a portion that is transparent  
3   to a photolithography radiation to a wall, the wall being attached to a patterned mask  
4   having a portion that is opaque to the photolithography radiation, the attaching  
5   enclosing a volume of a second gas between the mask protective device and the  
6   patterned mask;

7                         adding the first gas to the enclosed volume of the second gas, the first gas  
8   having a different composition than the second gas; and  
9                         removing the second gas from the enclosed volume.

1           29. The method of claim 28, further comprising transmitting the  
2 photolithography radiation through the mask protective device for a predetermined  
3 period of time.

1           30. The method of claim 28, wherein attaching comprises attaching with an  
2 adhesive.